

1663: Store the spring winds? Isn't that a lot of energy?

Migliori: Yes. There are minutes in New Mexico when 25 percent of our power comes from wind farms—over 200 million watts from wind power! It's the highest fractional utilization of any state. There's enough energy generated by New Mexico wind farms in March and April to run a utility grid for weeks without turning on a coal or nuclear plant.

Thorn: The problem is we don't have the means to store that much electrical energy, and conservative, incremental improvements in storage technology won't get us there. We need revolutionary changes.

Migliori: But even if you develop a high-tech battery or something that could store two-months worth of wind energy, all-that energy would be parked on a windswept ridge miles from anything. To get it to Albuquerque, you'd have to build a costly, high-power transmission line.

The idea is to go to a distributed storage system. This is something the Laboratory has looked into and is ready to contribute to in a major way.

There's already a utility grid that carries power to every New Mexico home. What if every house had a little bit of electrical-storage capacity, say a bank of lithium-ion batteries that sat in a box beneath the electric meter? You could then use the existing grid to distribute the output of your wind farm to thousands of these storage boxes. There would be no need to build new transmission lines.

Plus, with distributed storage, a state or regional utility could run its coal-fired or nuclear power plants all the time under optimum conditions so that the plants generated the minimum amount of atmospheric carbon or nuclear waste per unit of electricity. The utility would charge up these storage boxes when there was power to burn, so to speak, then recover the electricity when needed. Ultimately, the utility would have some control over when electricity went to, say, the boiler, air conditioner, and dishwasher in a house. Then during the summer, they could stagger air conditioner "on” times, even if it was just for 10 minutes or so, to allow time for more power sources to come online and supply electricity.

Thorn: A similar idea is being floated right now because once you put that kind of communication and control in place, a utility could really optimize the use of its resources. But the grid is a massive network, and distributed storage entails integrating thousands of storage units into it. Making it work efficiently would involve a significant modeling and computation effort that would be just as important as developing the electrical-storage units themselves.

Migliori: With our expertise in both modeling and computation, that problem is tailor-made for Los Alamos. It's a wonderful opportunity.

Thorn: We also have to consider that in the United States, about one-third of our energy goes towards heating homes and buildings, one-third goes towards producing electricity, and one-third goes towards transportation. Because transportation is strongly dependent on foreign oil, there's a great motivation, maybe even an imperative, to develop alternative fuels and/or electrical storage systems that could be used to power an electric car.